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A NEW SPECIES OF *CHOEROPHRYNE* (ANURA: MICROHYLIDAE) FROM SOUTHERN HIGHLANDS PROVINCE, PAPUA NEW GUINEA

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Summary

RICHARDS, S. J. & BURTON, T. C. (2003) A new species of *Choerophryne* (Anura: Microhylidae) from Southern Highlands Province, Papua New Guinea. *Trans. R. Soc. S. Aust.* **127**(1), 47–51, 31 May, 2003.

Choerophryne allisoni sp. nov. is described from mid-montane rainforest on Mt Sisa, Southern Highlands Province, Papua New Guinea. It is distinguished from all congeners by its very small size (two males 11.5 and 11.6 mm SV) and reduced snout overhang. Males call from within leaf litter on the forest floor during and after heavy rain. The advertisement call is a short "bleat" with 5–6 notes, a dominant frequency of 4220–4959 Hz and a note repetition rate of 15.6–15.8/s.

KEY WORDS: Anura, Microhylidae, *Choerophryne allisoni* sp. nov., Papua New Guinea, new species, advertisement call.

Introduction

The taxonomic and nomenclatural status of frogs in the microhylid genus *Choerophryne* has been labile for the past 90 years, with the number of recognised taxa and their generic positions changing several times (Wandolleck 1911; van Kampen 1914; Parker 1934; Menzies & Tyler 1977). In a recent review of *Choerophryne*, Kraus & Allison (2001) recognised two taxa, *C. proboscidea* van Kampen and *C. rostellifer* (Wandolleck), and described a third species, *C. longirostris*, based on material from western Papua New Guinea.

The three species in *Choerophryne* are small frogs with elongated, protruding snouts (Kraus & Allison 2001). *Choerophryne proboscidea* is known from widely scattered locations in lowland and foothill forests across much of northern New Guinea. *Choerophryne rostellifer* is known from the north-coast ranges and Hunstein Mountains in northern Papua New Guinea, and a single location on the south side of the Star Mountains. *Choerophryne longirostris* has been reported only from Mt Menawa in the Bewani Mountains (Kraus & Allison 2001). In this paper we describe a fourth *Choerophryne* that differs from congeners in its extremely small size, relatively shorter snout, and different advertisement call.

Methods

Measurements (to 0.1 mm) were made with dial calipers and a microscope fitted with an ocular micrometer and follow Zweifel (1985) and Zweifel & Parker (1989) with additional measurements from Kraus & Allison (2001). They were snout-vent length (SV), tibia length (TL), arm length (AL), head width at the angle of the jaws (HW), head length as a straight-line distance from angle of jaws to tip of snout (HL), eye diameter (EYE), inter-narial distance (IN), eye-naris distance (EN), snout overhang (SO), width of third finger disc at right angle to digital axis (3FD) and width of penultimate phalanx of third finger (3FP), width of first finger disc (1FD) and first phalanx (1FP), and of fourth toe disc (4TD) and fourth toe phalanx (4TP), as for third finger. The tympanum of the new species is indistinct, precluding accurate measurements. Superficial dissection of the pectoral girdle and snout was undertaken to determine the generic status. Advertisement calls were recorded with a Sony Pro-Walkman tape recorder and Sony ECM-Z200 microphone, and 13 calls from two males were analyzed using the AVISOFT SAS-Lab Pro sound analysis program. Temperatures adjacent to calling males were measured with a Miller & Weber quick-reading thermometer. Specimens are deposited in the South Australian Museum, Adelaide (SAMA) and the University of Papua New Guinea (UP).

Results

Generic Diagnosis

The new species lacks clavicles or any pre-zonal elements of the pectoral girdle. The otic ramus of the squamosal is much elongated. The *m. depressor mandibulae* arises from this ramus, but lacks any origin from the dorsal fascia. Reduction of the pectoral girdle is shared by *Albericus*, *Aphantophryne*, *Choerophryne*, *Cophixalus* and *Copiula*, and the conditions of the otic ramus and the *m. depressor mandibulae* are shared by *Albericus* and *Choerophryne* alone. The processes of the

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premaxillae are directed anteriorly: a character unique to *Choerophryne*.

Choerophryne allisoni sp. nov.
(FIGS 1-4)

Holotype: ♂ SAMA R56075, Mt Sisa, Southern Highlands Province, Papua New Guinea, 6° 07.547′ S, 142° 46.091′ E, altitude 2000 m, 20.x.1999, Coll. S. J. Richards.

Paratype: ♂ UP 9962, same data as for holotype.

Definition

A very small species (♂♂ 11.5-11.6 mm SV) with a moderately elongated snout (SO/SV 0.034-0.035) and short legs (TL/SV 0.33); first finger reduced, tips of digits rounded or expanded into small discs, disc of fourth toe larger than disc of third finger; advertisement call of 5-6 notes each with 2-7 pulses.

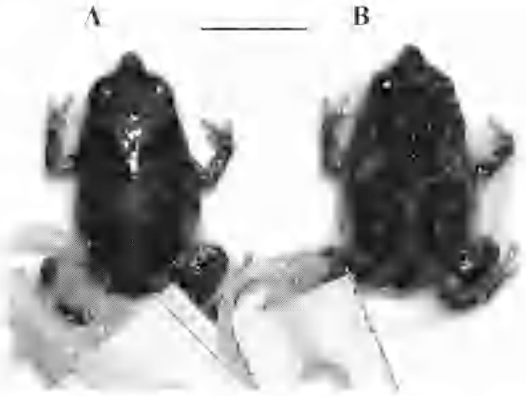

Fig. 1. *Choerophryne allisoni* sp. nov. Dorsal view of A. holotype (SAMA R56075) and B. paratype (UP 9962). Scale bar = 5 mm

Fig. 2. *Choerophryne allisoni* sp. nov. in life (holotype, SAMA R56075), SV 11.6 mm

Description of Holotype

Adult ♂ (with vocal slits and calling when collected) with the following measurements (mm) and proportions. Those of the adult ♂ paratype are given in parentheses. SV 11.6 (11.5); TL 3.8 (3.8); AL 4.2 (4.3); HW 4.4 (4.5); HL 3.9 (3.7); EN 1.1 (1.1); IN 0.8 (0.8); EYE 1.5 (1.4); SO 0.4 (0.4); 3FP 0.3 (0.3); 3FD 0.4 (0.4); 1FP 0.25 (0.25); 1FD 0.25 (0.25); 4TP 0.4 (0.4); 4TD 0.5 (0.5); TL/SV 0.33 (0.33); HW/SV 0.39 (0.39); HL/SV 0.28 (0.28); HL/HW 0.71 (0.71); EYE/SV 0.13 (0.12); IN/SV 0.07 (0.07); EN/SV 0.09 (0.10); SO/SV 0.034 (0.035); EN/IN 1.38 (1.38); TD/SV 0.04 (0.04); 3FD/SV 0.03 (0.03).

Head moderately narrow (HW/SV 0.39); snout narrow, elongate, projecting well beyond lower jaw; canthus rostralis broadly rounded, slightly curved; loreal region slightly concave, nearly vertical; eye to naris distance greater than internarial span (EN/IN 1.38); tympanic membrane poorly defined, posterior and dorsal portions of annulus indistinct; two palatal ridges, anterior ridge low, indistinct, posterior ridge with elevated, very distinct tubercles.

Relative lengths of fingers 3>4>2>1; first finger reduced, reaching only to base of second, without expanded terminal disc but with faint indication of circum-marginal groove; tips of fingers 2-4 not or only slightly expanded, with distinct circum-marginal grooves; fingers without subarticular tubercles or webbing. Relative lengths of toes 4>3>5>2>1; first toe partially fused to second; tips of digits rounded or expanded into small round discs with circum-marginal grooves; toes without subarticular tubercles or webbing, no metatarsal tubercles; expansion of terminal discs greatest on finger 3 and toe 4; fourth toe disc larger than third finger disc.

Skin slightly rugose dorsally in life, smooth dorsally except for few low, scattered tubercles in preservative (Figs 1, 2); slightly granular ventrally.

Colour and pattern: In life, dorsum dark brown, speckled laterally with small white spots and dorsally with scattered red pigments; snout anterior to and below eye darker than rest of dorsum; an irregular very dark brown bar extends from behind each eye postero-dorsally onto dorsum, converging at vertebral line and forming a broad **V**. Dark bar continues posteriorly as a broken vertebral line before diverging again as an inverted **V**-shaped stripe, extending postero-laterally from mid-line past lumbar region and reaching groin; from groin it continues transversely across each thigh and tibia. A triangular patch of paler grey-brown extends from a line between eyes to anterior edge of **V**-shaped stripe. Dark brown to black pigmentation surrounds vent; a pale mid-vertebral stripe from tip of snout

diverges above vent and continues laterally along posterior edge of thigh and tibia; darker brown pigmentation forms a poorly defined short stripe laterally. Ventrally with dense brown pigmentation on belly; brown pigmentation disrupted by numerous unpigmented spots on throat, and by large unpigmented patches on ventral surfaces of thighs and arms; a pale stripe extends from tip of lower jaw to vent, and a second pale stripe extends at right angles across chest from elbow to elbow. Palmar and plantar surfaces with extensive but patchy brown pigmentation. Iris pale gold flecked with dark brown.

Colour in preservative same as above except that scattered red pigments and darker pigment laterally on snout have faded.

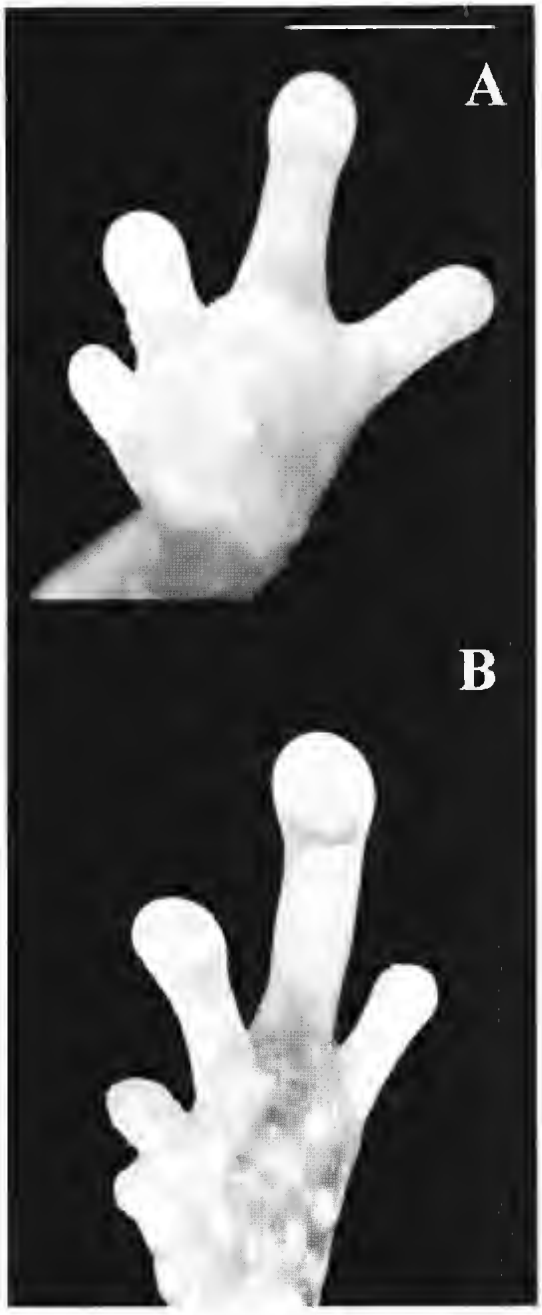

Fig. 3. *Choerophryne allisoni* sp. nov. A. Palmar view of left hand. B. Plantar view of right foot of paratype (UP9962). Plantar view has been inverted to permit direct comparison with palmar view. Scale bar = 1 mm

Variation

Measurements and proportions of the paratype are similar to holotype (see above). The paratype differs from the holotype in having a pale diamond-shaped inter-ocular bar surrounded by a dark-brown border, and in the following features of dorsal colouration: an hour-glass shaped patch of dark brown pigmentation across centre of the dorsum results in two large, triangular grey-brown patches dorso-laterally and another paler patch postero-dorsally; two pale spots slightly anterior to the lumbar region; an indistinct dark brown stripe originates at the dorsal midline posterior to the pale lumbar spots and diverges postero-laterally, extending across the thigh and tibia; patches of dense, dark brown mottling on the dorsal surfaces of the limbs. The first finger on one hand extends only to base of second finger, but on other hand extends about half-way along second finger (Fig. 3). First toe extensively fused to second toe (Fig. 3).

Advertisement call

The call is a single short 'bleat' with 5-6 notes. Two frogs (Table 1) called at intervals of 4.5-6.8 s. Each note consists of 2-7 pulses, although most notes

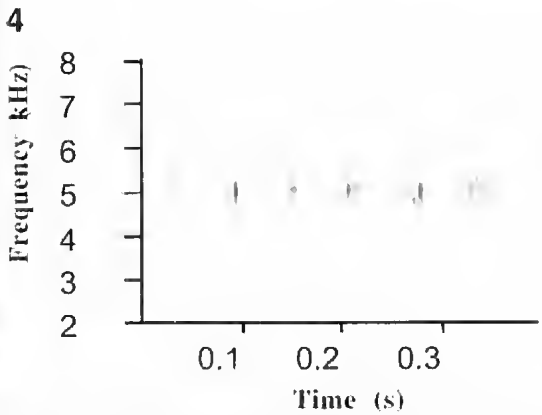

Fig. 4. Audiospectrogram of a single call of *Choerophryne allisoni* sp. nov. holotype (SAMA R56075).

have 3-6 pulses and there is a clear trend for the number of pulses to increase in the two terminal notes of each call (Fig. 4). The dominant frequency is 4220-4959 Hz, the pulse rate is 125-300/s and the note repetition rate is 15.6-15.8/s. Call parameters are presented in Table 1 and a single call is illustrated in Figure 4.

Comparison with other species

Choerophryne allisoni is the smallest member of the genus and is unlikely to be confused with any other species. *C. rostellifer* shares with *allisoni* a substantially reduced first finger, but differs from the new species in its larger size (SV 13.9-17.8), longer legs (TL/SV 0.44-0.54 vs 0.32-0.33; Kraus & Allison 2001) and advertisement call. The call of *C. rostellifer* has significantly more pulses/note (~14 vs 2-7 in *allisoni*), a lower dominant frequency (~3570 Hz vs 4200-5000) and slower note repetition rate (~7/s vs ~15/s). The opposite trend in note rate would be expected if temperature were responsible for these differences because *C. allisoni* recordings were made at substantially lower temperatures than those of *C. rostellifer*. Advertisement calls will also serve to distinguish the new species from calling male *C. longirostris* and *C. proboscidea*. The call of *C. proboscidea* consists of three notes uttered at a rate of 1.59 notes per second and has a dominant frequency of around 3230 Hz. The call of *C. longirostris* has 3-4 notes delivered at a rate of about 0.7/s and a dominant frequency around 3100 Hz. Each note consists of 11-14 pulses. *Choerophryne allisoni* is further distinguished from *C. longirostris* and *C. proboscidea* by its extremely small size and the following characters: first finger reduced (vs not reduced, and with a distinct terminal disc), and snout overhang moderate (SO/SV 0.4) vs snout overhang long (0.07-0.10 for *C. proboscidea*, and 0.10-0.11 for *C. longirostris*).

Distribution

Known only from the type locality in mid-montane rainforest on Mt Sisa, Southern Highlands Province, Papua New Guinea.

Habitat and habits

Choerophryne allisoni called from within leaf litter on the forest floor after heavy rain at night. No calling was heard on dry nights, and no animals were observed on or above the litter. The type locality is on a broad, gently sloping spur running to the north-east of Mt Sisa summit ridge. At this altitude (2000 m) the forest is in a transition zone between *Nothofagus*-dominated vegetation with a rather open understorey, and a more dense higher altitude moss forest. The species was absent from stunted moss forest near the summit of Mt Sisa at 2500 m asl.

Etymology

This species is named for Allen Allison of the Bishop Museum, Hawaii, in recognition of his contributions to New Guinea herpetology and in gratitude for his assistance to the authors over many years. The irony in a frog of such small stature being endowed with Allison's name has not escaped the authors' attention.

Discussion

The description of *C. allisoni* brings to four the number of species known in this genus. Relationships among the species are obscure (Kraus & Allison 2001) and the discovery of *C. allisoni* provides little further insight. The new species most closely resembles *C. rostellifer* in having a reduced first finger, and its size is closest to that species. However in its very short limbs, reduced snout overhang and poorly developed digital discs *C. allisoni* is quite distinct from its three congeners. These characters presumably reflect the terrestrial and near-fossorial habits of this species. Both of the specimens collected, and several others heard calling at the type locality, were under leaves on the forest floor. *C. longirostris*, *C. proboscidea* and *C. rostellifer* are at least partially scansorial, and use their moderately long limbs and expanded digital discs to climb into low vegetation. In contrast the short legs and poorly developed discs of *C. allisoni*

TABLE 1. *Advertisement call characteristics of* Choerophryne allisoni *sp. nov.* Data are presented as mean (SD) and range. Temperature was recorded about 1 cm below the litter surface adjacent to calling males.

Frog #	T_a (°C)	# of calls	call length	call rep. rate (calls/s)	notes/ call	note length	note rep. rate (notes/s)	pulses	pulse rep. rate (pulses/s)	dominant frequency (Hz)
SAMA R56075	15.6	7	0.279 (0.0039) 0.273-0.286	0.147	5	0.0159 (0.0053) 0.006-0.028	15.6 (0.317) 15.32-16.26	2-7	236.92 (37.24) 153.84-300.00	4620 (186.68) 4220-4888
N/A	15.6	6	0.339 (0.0041) 0.334-0.346	0.223	6	0.0164 (0.0059) 0.009-0.031	15.81 (0.358) 15.43-16.34	3-7	212.13 (36.71) 125.00-297.03	4759 (152.61) 4492-4959

are typical of microhylid frogs leading a terrestrial or semi-fossorial existence.

Acknowledgments

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